

“Again, Dozens of Refugees Drowned”: A Computational Study of Political Framing Evoked by Presuppositions

Qi Yu

Cluster of Excellence “The Politics of Inequality” & Department of Linguistics
University of Konstanz
qi.yu@uni-konstanz.de

Abstract

Earlier NLP studies on framing have focused heavily on shallow classification of issue framing, while framing effect arising from pragmatic cues remains neglected. We put forward this latter type of framing as *pragmatic framing*. To bridge this gap, we take presupposition-triggering adverbs such as ‘again’ as a study case, and investigate how different German newspapers use them to covertly evoke different attitudinal subtexts. Our study demonstrates the crucial role of presuppositions in framing, and emphasizes the necessity of more attention on *pragmatic framing* in future research.

1 Introduction

Framing, i.e., intentionally selecting certain aspects of an issue and making them more salient in a communicating text (Entman, 1993), is ubiquitous in political discourse. The release of corpora with manual annotation – mostly based on the codebook of *issue framing* by Boydstun et al. (2014) – has popularized the task of issue framing classification (see Section 2), e.g., classifying whether influx of migrants is presented from the perspective of economy or domestic security. However, the heavy focus on classification accuracy in earlier studies has resulted in very few in-depth investigations of the effects of individual linguistic cues in framing. Yet, in a study on framing strategies employed by different German newspapers in the discourse of the “European Refugee Crisis”¹ (2014–2018), we observed from an exploratory reading that iterative adverbs, including *erneut* ‘again’, *immer wieder* ‘again and again’, and *schon wieder* ‘yet again’, can act as subtle but effective cues of framing. Consider sentence (1):

- (1) *Erneut dutzende Flüchtlinge ertrunken*
‘Again dozens of refugees drowned’
(BILD, Feb. 8, 2016)

¹For details on the event: https://en.wikipedia.org/wiki/2015_European_migrant_crisis

Iterative adverbs like ‘again’ in (1) are known as *presupposition-triggers* in theoretical pragmatics, as they carry *presuppositions* (see, e.g., Levinson, 1983; Beaver et al., 2021). A presupposition of an utterance is background information that is “taken for granted” by the speaker, i.e., information that is not explicitly uttered but assumed by the speaker to be shared belief of all discourse participants (Stalnaker, 1972; Beaver, 1997; Zeevat, 2002). The word ‘again’ in sentence (1) triggers the presupposition \mathcal{P} below, as its usage assumes that all discourse participants already know \mathcal{P} .

- (2) \mathcal{P} = ‘It has already happened before (at least once) that refugees got drowned.’

We argue from two aspects that presuppositions and their triggers are crucial devices for framing. First, presuppositions can smuggle additional information into hearers’ belief systems: It is well studied in theoretical pragmatics that presuppositions can be *accommodated*, i.e., in many cases where the presupposition of an utterance conveys information that is new instead of known to its hearers, the hearers will just tacitly admit to this information in order to make sense of the utterance (Lewis, 1979; Stalnaker, 2002; von Stechow, 2008). A reader that did not know \mathcal{P} above at the time of reading sentence (1) will normally admit to \mathcal{P} silently in order to understand the author’s usage of ‘again’. Second, given a certain political context, presuppositions may bring up attitudinal subtextual messages as a concomitant: Once \mathcal{P} above is in the belief system of the readers of sentence (1) (either because they already knew \mathcal{P} before the reading, or because they *accommodated* \mathcal{P}), the attitudinal subtext \mathcal{A} below is likely to be evoked in their mind. We use \rightsquigarrow to denote the pragmatic relation that \mathcal{P} does not logically entail \mathcal{A} , but can plausibly give rise to \mathcal{A} . Concomitant attitudinal subtexts of this kind can covertly bias the hearers’ opinion towards the issue and thus give rise to framing effect.

- (3) $\mathcal{P} \rightsquigarrow (\mathcal{A} = \text{'Refugees are in urgent need of help as their safety is severely threatened.'})$

Such framing effects that arise indirectly from cues with significant pragmatic effects, e.g., presupposition-triggers discussed above, remain neglected in existing studies on framing. We put forward this type of framing as **pragmatic framing** (see Section 3 for detailed discussion). The automated detection of *pragmatic framing* is yet a challenging task: It can be only found via a close examination of the relevant linguistic cues, and (weakly-)supervised models as proposed by numerous earlier studies (see Section 2) are not necessarily able to capture the effect of such cues, as these cues can be extremely sparse. Following our observation on the iterative adverbs, this work quantitatively investigates whether iterative adverbs in different newspapers give rise to different attitudinal subtexts via presupposition, and thus result in different pragmatic framing styles. With this study, we aim at a) validating the argued importance of presupposition in framing, and b) exploring the possibility of automatically detecting *pragmatic framing*. Our contribution is two-fold:

1) Theoretically, we put forward the notion of *pragmatic framing*, and demonstrate its significance for research on framing detection via our case study on presupposition-triggering adverbs. To the best of our knowledge, this is also the first study on the role of presuppositions in framing.

2) Methodologically, we show that consciously combining theoretically motivated linguistic cues with NLP methods can yield crucial information for more in-depth framing detection.

2 Earlier NLP Studies on Framing

Along with the release of large-scale corpora annotated with issue frames (e.g., Card et al., 2015; Liu et al., 2019), numerous studies have been done on (weakly-)supervised classification of issue framing. The methods used vary from linear classifiers such as in Baumer et al. (2015) (naïve Bayes) and Field et al. (2018) (logistic regression), probabilistic soft logic as in Johnson et al. (2017), neural networks such as in Naderi and Hirst (2017) (LSTM) and Ji and Smith (2017) (RNN), to transformer-based language models such as BERT and RoBERTa (e.g., Khanehzar et al., 2019; Huguet Cabot et al., 2020; Akyürek et al., 2020; Mendelsohn et al., 2021).

Despite the classification accuracy of these proposed models, there still lacks an in-depth drilling

down into the effects of individual linguistic components. A few earlier studies have attempted to incorporate features that are motivated by theoretical linguistics: Baumer et al. (2015) validated the positive impact of various semantic and pragmatic features (including *factive verb*, *assertive word*, *entailment* and *hedging*) on the performance of a naïve Bayes classifier for frame classification. Demszky et al. (2019) investigated the usage of expressions for necessity modality (including *should*, *must*, *have to* and *need to*) among tweets about mass shooting events, as necessity modality bears the illocutionary force of calling for action or change in the discourse under discussion. Ziems and Yang (2021) examined the usage of agent-less passive constructions (e.g., using ‘He was killed’ instead of ‘He was killed *by police*’) in the discourse of police violence in view of the fact that such constructions obscure the actor entirely and thus remove blame from the actor.

Nevertheless, in the last decades theoretical linguistic researchers have uncovered many more pragmatic cues which have fundamental effects on conveying attitudes and steering the discourse development. Such cues are highly relevant for framing but remain unstudied, especially because many of them are stop words and prone to be dismissed in NLP practice. These include, but are not limited to, the aforementioned presupposition-triggers like *again* or *too* (Levinson, 1983; Beaver et al., 2021), focus particles like *even* or *only* (Rooth, 1985), modal particles like *indeed* (Zeevat, 2004; Zimmermann, 2011), and conventional implicature-bearing words like *luckily* or *confidentially* (Bach, 1999; Potts, 2005). With our case study on iterative adverbs, we aim at bridging this gap between NLP and theoretical linguistics.

3 Pragmatic Framing as a New Dimension of Framing

As described in Section 2, earlier NLP studies on framing detection are centered around *issue framing*, i.e., what aspects of an issue are covered in the discourse. However, our observation on the effect of presupposition-triggers in political discourse suggests that certain subtle pragmatic cues can evoke implicit, second-level subtextual communication, and this phenomenon remain neglected in the research on framing. We argue that such subtextual communication also constitutes a type of framing, as they covertly smuggle extra informa-

tion into the discourse besides the information conveyed by the surface form of the text (see Section 1). Grounded in this observation, we propose the notion of *pragmatic framing* as a new dimension of framing besides the *issue framing*. Pragmatic framing differs from issue framing in two aspects:

1) **Locus:** Issue framing is a content-level phenomenon. It is typically defined as describing what specific perspectives, values or facts of an issue are presented (see, e.g., Entman, 1993; Nelson et al., 1997; Druckman, 2011; Boydston et al., 2014). However, pragmatic framing is a linguistics-level phenomenon and describes *what specific linguistic devices are employed strategically in order to reinforce a certain perspective, value or fact*. Pragmatic framing is rooted in the usage of fine-grained pragmatic cues, and it contributes to the conveyance of issue frames in a rhetorical sense.

2) **Accessibility:** Whereas issue framing are mostly directly accessible from the surface form of the text, pragmatic framing goes beyond the surface form and can only be reached indirectly through pragmatic procedures triggered by specific cues (e.g., hearer’s accommodation of presuppositions as mentioned in Section 1, or hearer’s pragmatic enrichment of a certain utterance as described in Grice, 1975). From the perspective of NLP, automatically identifying pragmatic framing requires close examination of particular pragmatic cues.

The notion of pragmatic framing also applies to a wide range of other theoretical linguistic features that trigger very specific types of discursive inferencing, such as those mentioned in Section 2. We believe that more attention on in-depth pragmatic devices will be a valuable enrichment of the research on framing, as the particular ways of presenting information are the core of framing, and the usage of subtle linguistic devices is in turn an essential part of information presentation.

4 Experiment

Our study focuses on the usage of iterative adverbs in political discourse as a case of pragmatic framing, and aims at examining whether iterative adverbs give rise to different attitudinal subtexts via presuppositions in different newspapers. The data and experimental setup are described below.

4.1 Data

We used a dataset comprising of articles about the “European Refugee Crisis” published between 2014

to 2018 by the three most circulated newspapers in Germany (Statista, 2021): *BILD*, *Frankfurter Allgemeine Zeitung* (FAZ), and *Süddeutsche Zeitung* (SZ). All three are nation-wide daily newspapers, and they build a balanced sample of differing styles and political orientations.

From each newspaper, we first collected articles with at least one match of the following quasi-synonyms of ‘refugee’: {*Flüchtling*, *Geflüchtete*, *Migrant*, *Asylant*, *Asylwerber*, *Asylbewerber*}. We then removed articles that were: 1) duplicated, 2) from non-political sections such as *Sport*, and 3) with a ratio of the ‘refugee’-synonyms lower than 0.01. Criterion 3) was experimentally defined, and it allowed us to remove most articles that mention the European Refugee Crisis only as a side-topic.

Following the observation from our exploratory reading mentioned in Section 1, we then extracted from the dataset all sentences that contain the iterative adverbs *erneut*, *immer wieder*, and *schon wieder*. We refer to these extracted sentences as *iterAdv-S*. Duplicated sentences in each newspaper were removed. Table 1 summarizes the dataset.²

name	type	#articles	#tokens	#sentences	# <i>iterAdv-S</i>
BILD	C, T	12,109	3,059,123	180,555	1,138
FAZ	C, B	6,700	3,342,609	168,725	558
SZ	L, B	4,561	1,766,921	93,224	557

Table 1: Overview of the dataset. (C = conservative; L = liberal; T = tabloid; B = broadsheet)

4.2 Experimental Setup

As the pragmatic framing evoked by iterative adverbs is a sentence-level phenomenon and we thus focus on *iterAdv-S* for our quantitative analysis described below, topic modelling approaches such as LDA would be inadequate due to their deficiency in handling short documents (Tang et al., 2014). Thus, we used a combination of clustering and keyword-mining methods. The experimental setup is described below stepwise. Additional details of hyperparameters are provided in Appendix A.

Vectorizing *iterAdv-S* Vectorizing the *iterAdv-S* is the basis of all following computational steps.

²The newspaper articles were purchased from their respective publishers. Unfortunately, due to their copyright regulations, we cannot make the dataset publicly available. But the code and model of our study are available in the following repository. All results reported in this paper can also be found in the Jupyter Notebook files there: <https://github.com/qi-yu/framing-by-presuppositions>

Given the success of transformer-based language models in issue framing classification (see the studies cited in Section 2), we decided to fine-tune the `bert-base-german-cased` model³ (12 layers, 768 hidden units, 12 attention heads) to achieve the vectorization. Considering that all articles in our dataset are labeled with sources (i.e., BILD, FAZ, & SZ), we decided to fine-tune the BERT on a source classification task using all articles, so that the model weights better represent the overall linguistic characteristics of our very topic-specific dataset. As BERT limits the input to be no longer than 512 tokens (*tokens* here refer to WordPieces generated by BERT-tokenizer, and the special tokens [CLS] and [SEP]), whereas numerous articles exceed this limit, we divided each article into segments of maximally 200 words long as inspired by Pappagari et al. (2019) to circumvent the limit. This resulted in 45,402 segments in all (BILD: 18,131; FAZ: 17,641; SZ: 9,630). We used these segments as input to BERT and classified each with their sources. The segments were split into training set and validation set in an 80/20 fashion. The accuracy on the validation set reached 0.87, indicating that the fine-tuned model was able to capture the major linguistic characteristics of the dataset.

Next, we vectorized the *iterAdv-S* by inputting each sentence to the fine-tuned BERT and extracting the embedding of the [CLS]-token of the 11th layer. The decision of using the [CLS] of the 11th layer was based on earlier studies which have shown that: 1) the embedding of [CLS] performs better as sentence representation than the average embedding of all tokens (Kalouli et al., 2021), and 2) semantic features are mostly captured by higher layers of BERT, whereas the last (12th) layer is very close to the actual classification task and thus less suitable as *semantic* representation (Kalouli et al., 2021; Jawahar et al., 2019; Lin et al., 2019).

K-Means Clustering For each newspaper, we then conducted a *k*-means clustering on the vectorized *iterAdv-S* using *scikit-learn* (Pedregosa et al., 2011). The clustering allows us to divide these sentences into latent subgroups and to investigate them at a finer granularity.

As a validation of the clustering results, for each newspaper we used the optimal cluster amount found by applying *silhouette coefficient* (Rousseeuw, 1987). Silhouette coefficient is a

³<https://huggingface.co/bert-base-german-cased>

method for validating the consistency of clusters generated by clustering algorithms. For each sample *i* which is assigned to cluster *A* by a certain clustering algorithm, its silhouette coefficient $s(i)$ is defined as the equation below, where $a(i)$ stands for the average distance between *i* and all other items in *A* (also known as *intra-cluster distance*), and $b(i)$ stands for the average distance between *i* and all items in the second-nearest cluster besides *A* (also known as *inter-cluster distance*):

$$s(i) = \frac{b(i) - a(i)}{\max\{a(i), b(i)\}}$$

The value of $s(i)$ ranges between [-1, 1]. The closer it is to 1, the better *i* matches the cluster *A*. A negative value occurs when the intra-cluster distance $a(i)$ is greater than the inter-cluster distance $b(i)$, indicating that assigning *i* to *A* is suboptimal.

We monitored the silhouette coefficient of each item (i.e., each vectorized *iterAdv-S*) with respect to cluster amounts $k \in [2, 50]$. For all newspapers, the optimal amount found was 3. Additional details are provided in Appendix B.

Mining Keywords of Each Cluster Though the clustering divided the *iterAdv-S* into smaller subgroups, manually examining the sentences in each cluster would still be challenging, as each cluster still contains hundreds of sentences (see Section 5). To ease the evaluation, we further used the keyword mining approach *PMI-freq* (Jin et al., 2020) to find the most representative keywords of each cluster in each newspaper. *PMI-freq* builds upon the measure of *pointwise mutual information* (*PMI*; Church and Hanks, 1990) by incorporating the document frequency of each word into the calculation, and thus overcomes *PMI*'s shortage of preferring rare words. Given a word *w* and a cluster *C*, the *PMI-freq* of *w* with respect to *C* is defined as follows, where $df(w)$ stands for the document frequency of *w*:

$$PMI-freq(w; C) \equiv \log(df(w)) \cdot \log \frac{P(w|C)}{P(w)}$$

Prior to applying *PMI-freq*, all *iterAdv-S* were tokenized and lemmatized using NLTK (Bird et al., 2009), and stop words, numbers and punctuations were removed.⁴

⁴These preprocessing steps were not applied at the sentence vectorization stage, as they would cause a loss of contextual information for BERT. However, here they are relevant, as the keyword mining step aims at examining the lexical usage of each cluster to find out their semantic characteristics.

5 Results and Discussion

Table 1 shows that the *iterAdv-S* are fairly scarce in all newspapers. However, our approach is still able to reveal stark contrasts between the pragmatic framing styles arising from them. Table 2 shows the top 15 words by *PMI-freq* in each cluster of each newspaper (translated into English; See Appendix C for the original German version together with the *PMI-freq* score of each word).

BILD The largest cluster (#2) of BILD indicates the salience of violence issues among the *iterAdv-S* in BILD, as shown by keywords like ‘ISIS’, ‘aggressive’ (German: *aggressiv*), ‘violence’ (*Gewalt*) and ‘riot’ (*randalieren*). We also found out that *iterAdv-S* which contain the keywords ‘initial reception center’ (*Erstaufnahmeeinrichtung*) and ‘refugee camp’ (*Flüchtlingsunterkunft*) are often about violent incidents in refugee camps. This salience of violence issues is furthermore reflected by several keywords in Cluster #3 including ‘incident’ (*Zwischenfall*), ‘attack’ (*Übergriff*) and ‘perpetrate’ (*verüben*). Example (4) depicts the typical effect of iterative adverbs in violence-related sentences: They evoke a negative subtext that refugees are a *persistent* threat of the domestic security.

- (4) *Im Bahnhof [...] randalierten immer wieder Flüchtlinge.*
 ‘Refugees rioted at the train station again and again.’ (BILD, Sep. 1, 2018)

\mathcal{P} = ‘Refugees have been rioting before.’
 $\rightsquigarrow \mathcal{A}$ = ‘Refugees continuously threaten the public order.’

Moreover, the keywords ‘ship’ (*Schiff*), ‘deadly’ (*tödlich*) and ‘port’ (*Hafen*) in Cluster #3 show a slight focus of the *iterAdv-S* in BILD on security issues at the Mediterranean route. As shown before in Example (1), iterative adverbs in this context evoke the subtext that the refugees need help.

FAZ Keywords in the largest cluster (#3) of FAZ show a mixed focus on both the security situation at the Mediterranean route, e.g., ‘Greece’ (*Griechenland*), ‘human trafficker’ (*Schlepper*) and ‘smuggler’ (*Schmuggler*), as well as on violence issues, e.g., ‘foreigner’ (*Ausländer*, often used in reports on attacks against foreigners), ‘police’ (*Polizei*), and ‘violence’ (*Gewalt*). However, while two of three clusters in BILD address violence and security issues (#2 and #3), two of three clusters in FAZ

(#1 and #2) show a clear focus on asylum policies. This is reflected by policy-specific words like ‘right of asylum’ (*Asylrecht*, #1), names of political actors like ‘Prime Minister’ (*Ministerpräsident*, #2), as well as words related to political negotiations like ‘reproach’ (*vorwerfen*, #1) and ‘conversation’ (*Gespräch* #2). Example (5) depicts the typical effect of iterative adverbs in sentences containing these keywords: A closer check indicates that iterative adverbs there often evoke the subtext that the execution of refugee policies is hard (and sometimes rendered as inefficient) because of *repeating* conflicts of interest between parties or countries.

- (5) *Italien wird immer wieder vorgeworfen, es setze die EU-Vorschrift nicht durch.*
 ‘Italy is again and again accused of not executing EU-regulation.’ (FAZ, Sep. 7, 2015)

\mathcal{P} = ‘Italy has been criticized at least once.’
 $\rightsquigarrow \mathcal{A}$ = ‘Italy is a stumbling block in executing the EU immigration policy.’

SZ The largest cluster (#2) in SZ shows the salience of security issues at the Mediterranean route among the *iterAdv-S*, as indicated by keywords like ‘Mediterranean Sea’ (*Mittelmeer*), ‘refugee boat’ (*Flüchtlingsboot*), ‘coast’ (*Küste*), ‘Libyan’ (*libysch*) and ‘Greece’ (*Griechenland*). In the sentences containing these keywords, iterative adverbs evoke the same humanitarian leaning subtext as illustrated in Example (1). Moreover, the top 2 keywords ‘man’ (*Mann*) and ‘young’ (*jung*) of Cluster #3 indicate an interesting emphasis on the demographic characteristics of the refugees. In a closer check, we found out that these keywords, besides being used in narrative texts about individual experiences of the refugees, often occur in context concerning the social integration of young male refugees. Sentence (6) shows an example: In such context, the iterative adverbs evoke a subtext that appeals to immediate action to facilitate the integration. Overall, the focus on security and integration issues indicates SZ’s tendency of framing the Refugee Crisis from a humanitarian aspect.

- (6) *Wenn diese jungen [...] zu lange ohne Beschäftigung herumsitzen, kommt es immer wieder zu Streit und Massenschlägereien.*
 ‘When these young people are idle for too long, quarrels and brawls happen

BILD		
Cluster #2: 428 Samples	Cluster #3: 381 Samples	Cluster #1: 329 Samples
today, yesterday, o'clock, direction, explain, speaker, ISIS, Syrian, aggressive, Asylum, around, planned, person, Athens, start (v.), initial reception center, thousand, violence, riot (v.), flame, grand coalition, Hannover, standing, flare up, press conference, evening, commit (a crime)/beat, refugee camp, advertise	attempt (v.), give, incident, name (n.), bring, big, get, situation, hear, ship, deadly, know, story/history, government, port, think, calm (down), help (v.), arise, manage (to do), find, attack (n.), speak, perpetrate, politics, past (n.), past (adj.)	Angela, Friday, Merkel, reject (v.), refugee policy, controversial, CSU, Monday, upper limit, attack (v.), Greece, rescue, end (n.), Seehofer, chancellor
FAZ		
Cluster #3: 223 Samples	Cluster #1: 204 Samples	Cluster # 2: 131 Samples
give, attract attention, money, aid agency, see, foreigner, help (n.), police, Greece, situation, lead, say, stand, policeman, confirm, lacking (adj.), refugee accommodation, human trafficker, smuggler, week, violence, The Greens, Austria, last (adj.), together, Greek, prognosis, civil servant, camp, security force, report (n.), accommodation, because, new	far, stay, name (v.), right of asylum, belong, go, chancellor, speak, reproach (v.), Turkey, let, number, manage (to do), country, get, The Left, Bavarian, openness, boat, yield, Munich, always, port, game, appeal to, planned, municipality, bring, show, do	city, day, Prime Minister, institution, Frankfurt, old, state government, Mayor, conversation, end (n.), population, year, letter, located, Heidelberg, non-party, inquiry, district, reason, accommodate, tell, difficulty, wild, euro, refugee policy, open (adj.), live (v.), Italian, possible, development, search (v.), political, without, demonstrate, homeland
SZ		
Cluster #2: 217 Samples	Cluster #3: 187 Samples	Cluster #1: 153 Samples
person, Mediterranean Sea, refugee boat, Calais, coast, weekend, Sunday, asylum seeker, European Commission, Libyan, thousand, Greek, Angela, pressure, Greece, Merkel, get into, Federal Office, deportation, Italy, migration, boat, before, attack (n.), number	man, young, month, past (adj.), report (v.), stand (v.), new, year, just, prevent, group, money, sentence, hear, lead, seldom, call (v.), experience (n.), along, attitude, message, find, attempt (v.)	know, Federal Office for Migration and Refugees, Bavaria, Horst, Seehofer, political, Thursday, Hungary, place (n.), correct (adj.), Wednesday, name (v.), Friday, solidarity, speak, time/once, decide, let, human rights group, international, if possible, mouth, EU state, complain, own, CSU, demand

Table 2: The top 15 keywords by *PMI-freq* in each cluster of each newspaper. The clusters in each newspaper are ordered by their size from left to right. The words are separated by a comma, and additional explanation is given in parenthesis. Note that multiple words can have equal *PMI-freq* score.

again and again.' (SZ, Feb. 19, 2016)

\mathcal{P} = 'Quarrels and brawls have happened at least once.'

\rightsquigarrow \mathcal{A} = 'To avoid such violence, the integration of refugees into the labor market should be taken priority.'

6 Conclusion

Grounded in established pragmatics theory, we argued for the importance of presuppositions in framing, and put forward the notion of *pragmatic framing*. This was validated by our computational study on the case of iterative adverbs. Given the sparsity of the iterative adverbs, such pragmatic framing would be difficult to detect with many of the (weakly-)supervised classification approaches pursued in earlier studies, but we showed that it

can be uncovered via consciously combining deep linguistic knowledge with NLP approaches. We see our work as a step towards successfully incorporating theoretical linguistic insights into NLP applications.

Acknowledgements

This work was funded by the Deutsche Forschungsgemeinschaft (DFG - German Research Foundation) under Germany's Excellence Strategy - EXC-2035/1 - 390681379. The author greatly appreciates Kristen Johnson, her mentor of the NAACL SRW 2022, for the valuable suggestions. Furthermore, the author thanks the helpful feedback from Miriam Butt and all anonymous reviewers.

References

- Afra Feyza Akyürek, Lei Guo, Randa Elanwar, Prakash Ishwar, Margrit Betke, and Derry Tanti Wijaya. 2020. [Multi-label and multilingual news framing analysis](#). In *Proceedings of the 58th Annual Meeting of the Association for Computational Linguistics*, pages 8614–8624, Online. Association for Computational Linguistics.
- Kent Bach. 1999. The myth of conventional implicature. *Linguistics and philosophy*, pages 327–366.
- Eric Baumer, Elisha Elovic, Ying Qin, Francesca Polletta, and Geri Gay. 2015. [Testing and comparing computational approaches for identifying the language of framing in political news](#). In *Proceedings of the 2015 Conference of the North American Chapter of the Association for Computational Linguistics: Human Language Technologies*, pages 1472–1482, Denver, Colorado. Association for Computational Linguistics.
- David Ian Beaver. 1997. Presupposition. In *Handbook of logic and language*, pages 939–1008. Elsevier.
- David Ian Beaver, Bart Geurts, and Kristie Denlinger. 2021. Presupposition. In Edward N. Zalta, editor, *The Stanford Encyclopedia of Philosophy*. Metaphysics Research Lab, Stanford University.
- Benjamin Bengfort, Rebecca Bilbro, Nathan Danielsen, Larry Gray, Kristen McIntyre, Prema Roman, Zijie Poh, et al. 2018. [Yellowbrick](#).
- Steven Bird, Ewan Klein, and Edward Loper. 2009. *Natural language processing with Python: Analyzing text with the natural language toolkit*. O’Reilly Media.
- Amber E. Boydston, Dallas Card, Justin H. Gross, Philip Resnik, and Noah A. Smith. 2014. Tracking the development of media frames within and across policy issues. <https://homes.cs.washington.edu/~nasmith/papers/boydstun+card+gross+resnik+smith.apsa14.pdf>, last accessed on March 24, 2022.
- Dallas Card, Amber E. Boydston, Justin H. Gross, Philip Resnik, and Noah A. Smith. 2015. [The media frames corpus: Annotations of frames across issues](#). In *Proceedings of the 53rd Annual Meeting of the Association for Computational Linguistics and the 7th International Joint Conference on Natural Language Processing (Volume 2: Short Papers)*, pages 438–444, Beijing, China. Association for Computational Linguistics.
- Kenneth Ward Church and Patrick Hanks. 1990. [Word association norms, mutual information, and lexicography](#). *Computational Linguistics*, 16(1):22–29.
- Dorottya Demszky, Nikhil Garg, Rob Voigt, James Zou, Jesse Shapiro, Matthew Gentzkow, and Dan Jurafsky. 2019. [Analyzing polarization in social media: Method and application to tweets on 21 mass shootings](#). In *Proceedings of the 2019 Conference of the North American Chapter of the Association for Computational Linguistics: Human Language Technologies, Volume 1 (Long and Short Papers)*, pages 2970–3005, Minneapolis, Minnesota. Association for Computational Linguistics.
- James N. Druckman. 2011. What’s it all about? framing in political science. *Perspectives on framing*, 279.
- Robert M. Entman. 1993. Framing: Toward clarification of a fractured paradigm. *Journal of communication*, 43(4):51–58.
- Anjalie Field, Doron Kliger, Shuly Wintner, Jennifer Pan, Dan Jurafsky, and Yulia Tsvetkov. 2018. [Framing and agenda-setting in Russian news: a computational analysis of intricate political strategies](#). In *Proceedings of the 2018 Conference on Empirical Methods in Natural Language Processing*, pages 3570–3580, Brussels, Belgium. Association for Computational Linguistics.
- Kai von Fintel. 2008. What is presupposition accommodation, again? *Philosophical perspectives*, 22:137–170.
- Herbert P. Grice. 1975. Logic and conversation. In *Speech acts*, pages 41–58. Brill.
- Pere-Lluís Hugué Cabot, Verna Dankers, David Abadi, Agneta Fischer, and Ekaterina Shutova. 2020. [The Pragmatics behind Politics: Modelling Metaphor, Framing and Emotion in Political Discourse](#). In *Findings of the Association for Computational Linguistics: EMNLP 2020*, pages 4479–4488, Online. Association for Computational Linguistics.
- Ganesh Jawahar, Benoît Sagot, and Djamel Seddah. 2019. [What does BERT learn about the structure of language?](#) In *Proceedings of the 57th Annual Meeting of the Association for Computational Linguistics*, pages 3651–3657, Florence, Italy. Association for Computational Linguistics.
- Yangfeng Ji and Noah A. Smith. 2017. [Neural discourse structure for text categorization](#). In *Proceedings of the 55th Annual Meeting of the Association for Computational Linguistics (Volume 1: Long Papers)*, pages 996–1005, Vancouver, Canada. Association for Computational Linguistics.
- Yiping Jin, Dittaya Wanvarie, and Phu T.V. Le. 2020. Learning from noisy out-of-domain corpus using dataless classification. *Natural Language Engineering*, pages 1–31.
- Kristen Johnson, Di Jin, and Dan Goldwasser. 2017. [Leveraging behavioral and social information for weakly supervised collective classification of political discourse on Twitter](#). In *Proceedings of the 55th Annual Meeting of the Association for Computational Linguistics (Volume 1: Long Papers)*, pages 741–752, Vancouver, Canada. Association for Computational Linguistics.

- Aikaterini-Lida Kalouli, Rebecca Kehlbeck, Rita Sevastjanova, Oliver Deussen, Daniel Keim, and Miriam Butt. 2021. [Is that really a question? going beyond factoid questions in NLP](#). In *Proceedings of the 14th International Conference on Computational Semantics (IWCS)*, pages 132–143, Groningen, The Netherlands (online). Association for Computational Linguistics.
- Shima Khanehzar, Andrew Turpin, and Gosia Mikolajczak. 2019. [Modeling political framing across policy issues and contexts](#). In *Proceedings of the The 17th Annual Workshop of the Australasian Language Technology Association*, pages 61–66, Sydney, Australia. Australasian Language Technology Association.
- Stephen C. Levinson. 1983. *Pragmatics*. Cambridge university press.
- David Lewis. 1979. Scorekeeping in a language game. In *Semantics from different points of view*, pages 172–187. Springer.
- Yongjie Lin, Yi Chern Tan, and Robert Frank. 2019. [Open sesame: Getting inside BERT’s linguistic knowledge](#). In *Proceedings of the 2019 ACL Workshop BlackboxNLP: Analyzing and Interpreting Neural Networks for NLP*, pages 241–253, Florence, Italy. Association for Computational Linguistics.
- Siyi Liu, Lei Guo, Kate Mays, Margrit Betke, and Derry Tanti Wijaya. 2019. [Detecting frames in news headlines and its application to analyzing news framing trends surrounding U.S. gun violence](#). In *Proceedings of the 23rd Conference on Computational Natural Language Learning (CoNLL)*, pages 504–514, Hong Kong, China. Association for Computational Linguistics.
- Julia Mendelsohn, Ceren Budak, and David Jurgens. 2021. [Modeling framing in immigration discourse on social media](#). In *Proceedings of the 2021 Conference of the North American Chapter of the Association for Computational Linguistics: Human Language Technologies*, pages 2219–2263, Online. Association for Computational Linguistics.
- Nona Naderi and Graeme Hirst. 2017. [Classifying frames at the sentence level in news articles](#). In *Proceedings of the International Conference Recent Advances in Natural Language Processing, RANLP 2017*, pages 536–542, Varna, Bulgaria. INCOMA Ltd.
- Thomas E. Nelson, Rosalee A. Clawson, and Zoe M. Oxley. 1997. Media framing of a civil liberties conflict and its effect on tolerance. *American Political Science Review*, 91(3):567–583.
- Raghavendra Pappagari, Piotr Żelasko, Jesús Villalba, Yishay Carmiel, and Najim Dehak. 2019. Hierarchical transformers for long document classification. In *2019 IEEE Automatic Speech Recognition and Understanding Workshop (ASRU)*, pages 838–844. IEEE.
- Fabian Pedregosa, Gaël Varoquaux, Alexandre Gramfort, Vincent Michel, Bertrand Thirion, Olivier Grisel, Mathieu Blondel, Peter Prettenhofer, Ron Weiss, Vincent Dubourg, Jake Vanderplas, Alexandre Passos, David Cournapeau, Matthieu Brucher, Matthieu Perrot, and Édouard Duchesnay. 2011. Scikit-learn: Machine learning in Python. *Journal of Machine Learning Research*, 12:2825–2830.
- Christopher Potts. 2005. *The logic of conventional implicatures*. Oxford University Press.
- Mats Edward Rooth. 1985. *Association with focus*. Ph.D. thesis, University of Massachusetts Amherst.
- Peter J. Rousseeuw. 1987. Silhouettes: A graphical aid to the interpretation and validation of cluster analysis. *Journal of computational and applied mathematics*, 20:53–65.
- Robert C. Stalnaker. 1972. Pragmatics. In Donald Davidson and Gilbert Harman, editors, *Semantics of natural language*, pages 380–397. D. Reidel Publishing Company.
- Robert C. Stalnaker. 2002. Common ground. *Linguistics and philosophy*, 25(5/6):701–721.
- Statista. 2021. *Statistiken zum Thema Zeitungen*. <https://de.statista.com/themen/176/zeitung/#dossierKeyfigures>, last accessed on March 24, 2022.
- Jian Tang, Zhaoshi Meng, Xuanlong Nguyen, Qiaozhu Mei, and Ming Zhang. 2014. Understanding the limiting factors of topic modeling via posterior contraction analysis. In *International Conference on Machine Learning*, pages 190–198.
- Henk Zeevat. 2002. Explaining presupposition triggers. *Information sharing*, pages 61–87.
- Henk Zeevat. 2004. Particles: Presupposition triggers, context markers or speech act markers. In *Optimality theory and pragmatics*, pages 91–111. Springer.
- Caleb Ziems and Diyi Yang. 2021. [To protect and to serve? analyzing entity-centric framing of police violence](#). In *Findings of the Association for Computational Linguistics: EMNLP 2021*, pages 957–976, Punta Cana, Dominican Republic. Association for Computational Linguistics.
- Malte Zimmermann. 2011. Discourse particles. In *Handbücher zur Sprach- und Kommunikationswissenschaft/Handbooks of Linguistics and Communication Science*, pages 2012–2038. De Gruyter Mouton.

A Hyperparameters

All hyperparameters used in our experiment described in Section 4.2 are listed below:

Fine-Tuning BERT The BERT model was fine-tuned for 4 epochs with a learning rate of $2e-5$ and a batch size of 16.

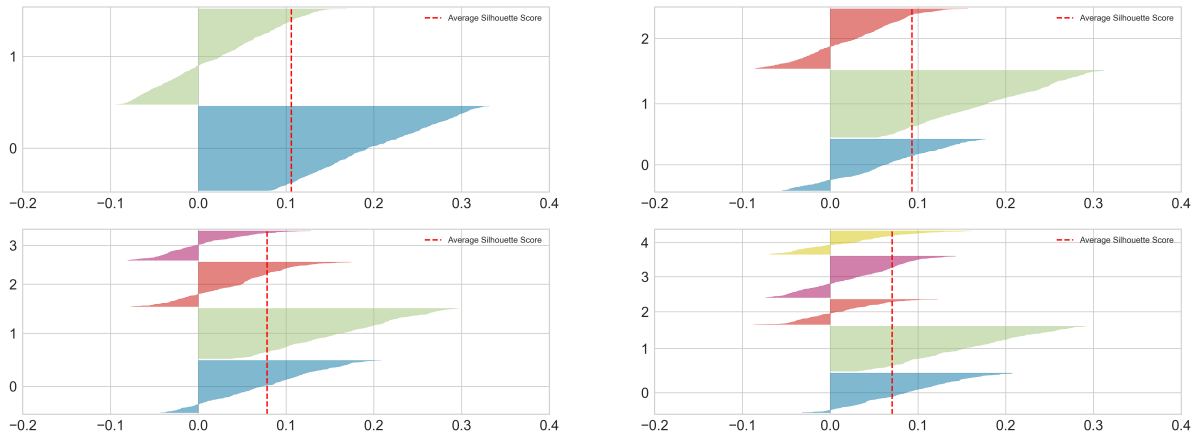
K-Means Clustering The k -means algorithm was run 100 times with different centroid seeds. The maximum iteration number was set to 2000, and the random state was set to 42.

B Silhouette Coefficient for Optimal Cluster Amount Searching

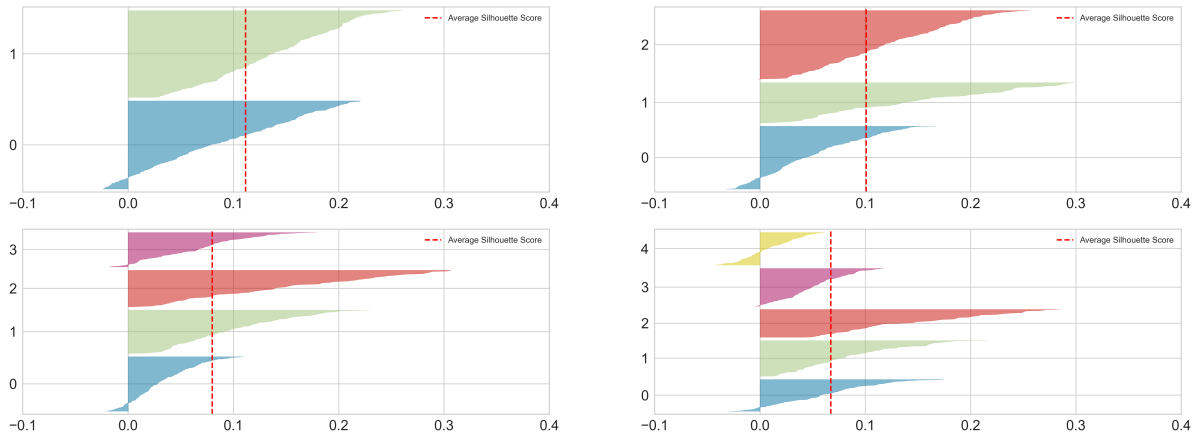
As described in Section 4.2, we applied silhouette coefficient to find the optimal cluster amount for clustering the *iterAdv-S* and experimented with cluster amounts $k \in [2, 50]$. Figure 1 visualizes the distribution of the silhouette coefficients under $k \in [2, 5]$ using the Python package *Yellowbrick* (Bengfort et al., 2018), with each color standing for one cluster. It can be observed that the average silhouette coefficient decreases continuously when k increases (This trend continues for all $k \in [2, 50]$, but in order to avoid redundancy, we only show the visualization of $k \in [2, 5]$ here). The best trade-off between the average silhouette coefficient and the amount of suboptimally clustered items (represented by the colored areas that stretch to left) is 3 for all three newspapers.

C Keywords of Each Cluster in German

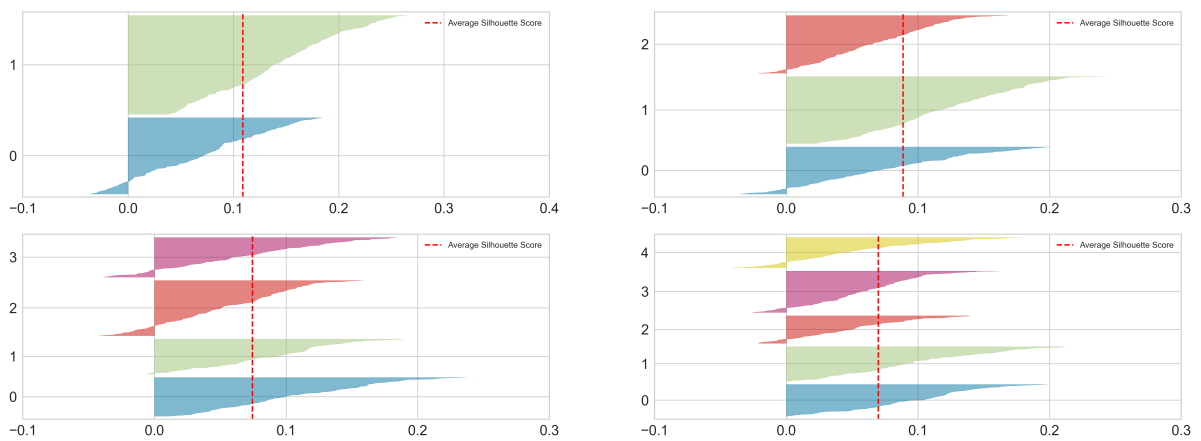
Figure 2, 3 and 4 shows the original German keywords that are ranked top 15 by *PMI-freq* in BILD, FAZ and SZ, respectively. The plots in each figure are ordered by the cluster size from left to right. The bars stand for the *PMI-freq* score. The words are separated by a comma. Multiple words assigned to one bar indicate that they have equal *PMI-freq* score.



(a) BILD



(b) FAZ



(c) SZ

Figure 1: Silhouette coefficients (represented by the horizontal axis) with respect to cluster amount $k \in [2, 5]$ (represented by the vertical axis). The red dash line represents the average silhouette coefficient.

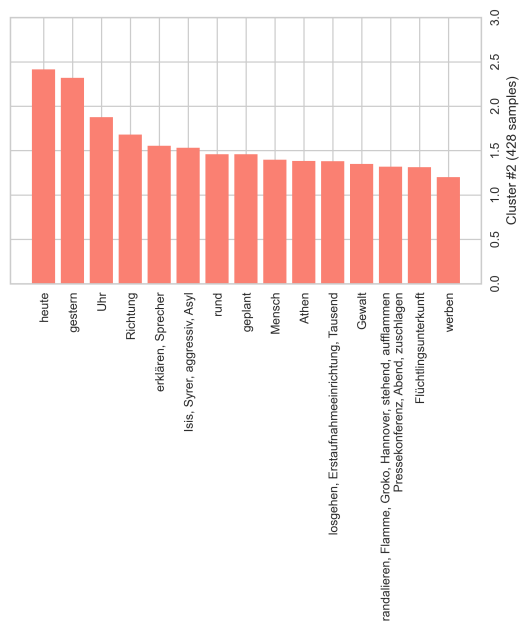
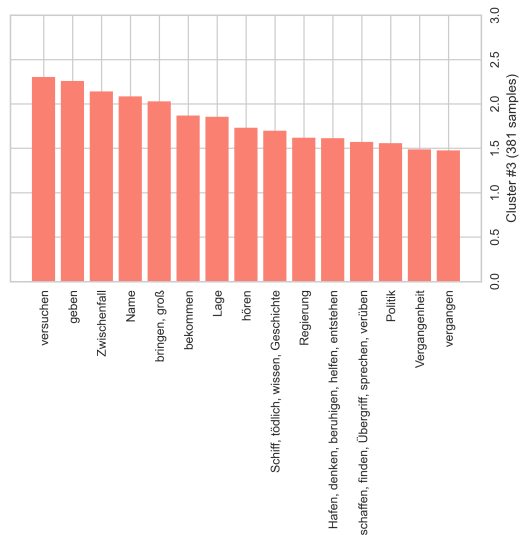
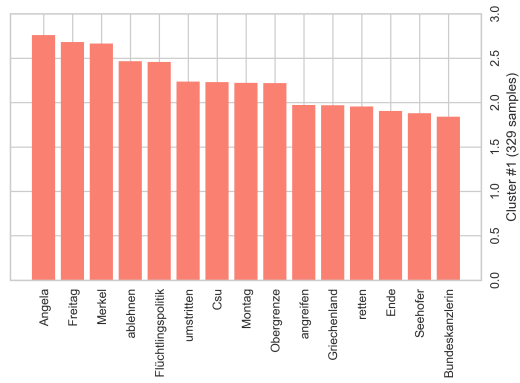


Figure 2: The top 15 keywords by *PMI-freq* in each cluster of BILD.

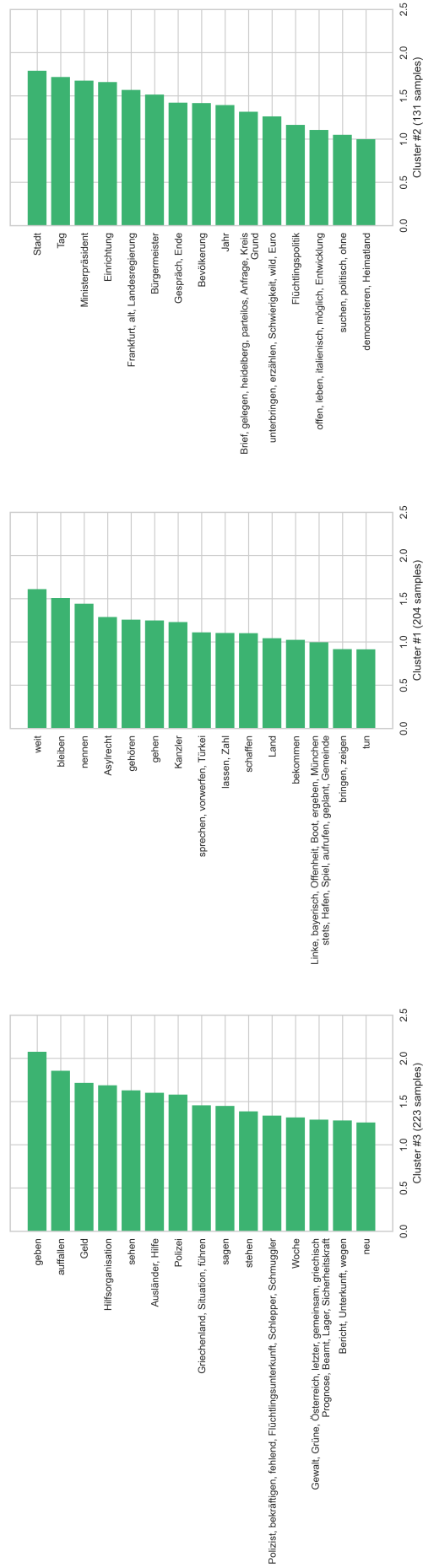


Figure 3: The top 15 keywords by *PMI-freq* in each cluster of FAZ.

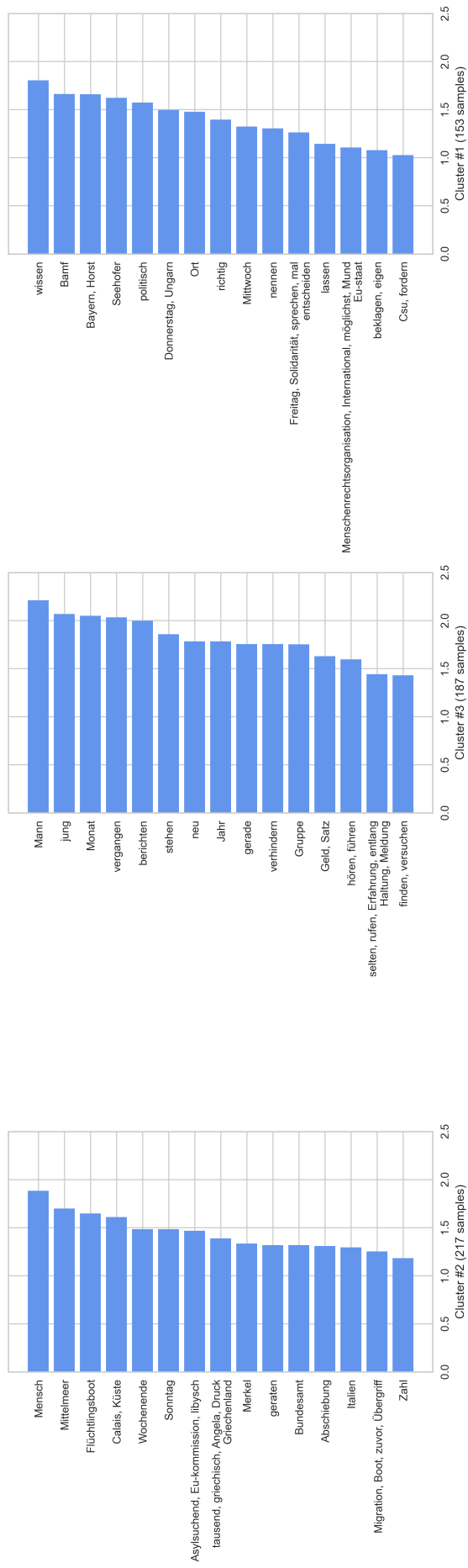


Figure 4: The top 15 keywords by *PMI-freq* in each cluster of SZ.